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C. F. MARVIN, CHIEF.



**BRIEF LIST OF
METEOROLOGICAL TEXTBOOKS
AND REFERENCE BOOKS**

A SELECTION OF WORKS SUITABLE FOR
GENERAL, SCIENTIFIC, AND UNIVERSITY
LIBRARIES IN THE UNITED STATES.

THIRD EDITION.

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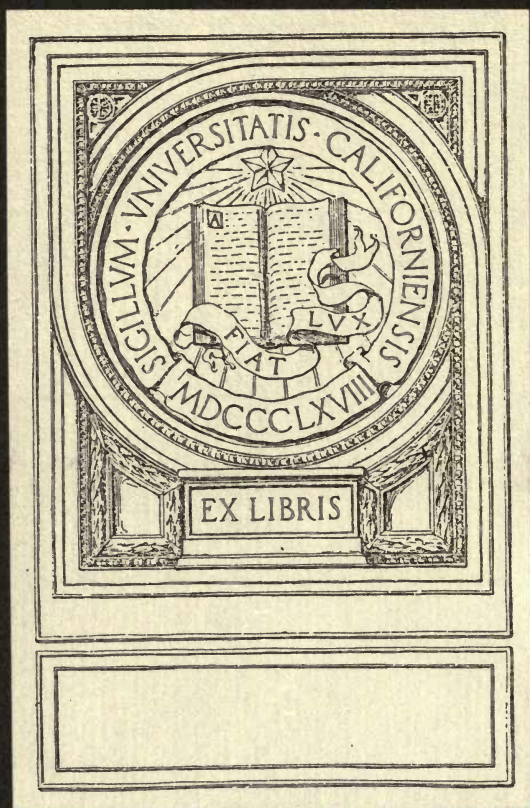
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JUNIOR PROFESSOR OF METEOROLOGY, IN CHARGE OF
WEATHER BUREAU LIBRARY.



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INTRODUCTION.

This compilation is designed, primarily, to guide the librarians of large general, scientific, and university libraries in the United States in selecting meteorological literature for their collections. It is also intended to provide a ready means of complying with the many requests received by the Weather Bureau from teachers, students, and others for the titles of books dealing with meteorology and its several branches.

While there is, of course, room for much difference of opinion as to what should be included in a list of about one hundred and fifty works, selected from many thousand, the present compilation is the fruit of several years' experience in dealing with the literature of this subject and will probably meet the requirements of the majority of American readers and students. Obviously, the limited scope of the list makes it necessary to exclude a great many important memoirs dealing with special topics and addressed to the specialist rather than the general student; also the innumerable periodical publications recording the results of observations at meteorological observatories and stations throughout the world; and many scientific journals devoted wholly or partly to meteorology.

Lastly, attention is called to the much more extensive bibliographical information to be found in such publications as the annual meteorological volumes of the International Catalogue of Scientific Literature, the Royal Society's Catalogue of Scientific Papers (a meteorological subject-index to which is in preparation), the annual Kosmische Physik volume of the Fortschritte der Physik, and, for the earlier literature on certain branches, the Bibliography of Meteorology published by the U. S. Signal Office in 1889-1891.

(3)

CLASSIFICATION.

1. Bibliography.
2. Meteorology in general.
3. Weather. Weather charts. Weather forecasts.
4. Atmospheric pressure and circulation. Dynamic meteorology.
5. Storms. Marine meteorology.
6. Economic effects of extreme temperatures. Frost protection.
7. Clouds.
8. Atmospheric electricity. Thunderstorms. Lightning protection.
9. Atmospheric optics.
10. Instruments. Instructions to observers.
11. Tables.
12. Upper-air investigations. Aeronautical meteorology.
13. Hydrology. Rivers and floods.
14. Phenology. Agricultural meteorology.
15. Physiological and medical meteorology.
16. Climatology.
17. Climatography.

BRIEF LIST OF METEOROLOGICAL TEXTBOOKS AND REFERENCE BOOKS.

1. BIBLIOGRAPHY.

- ***International catalogue of scientific literature . . .** F. Meteorology, including terrestrial magnetism. [Annual.] London. 1902–date. 8°. Continues, in classified form, the Royal society catalogue of scientific papers.
- ***Fortschritte der Physik . . .** Dargestellt von der Deutschen physikalischen Gesellschaft. [Annual.] Braunschweig (*formerly* Berlin). 1846–date. 8°. A classed catalogue of the physical literature of the year, with abstracts of the more important publications. Now published in three annual parts, of which the third, “*Kosmische Physik*” (formerly “*Physik der Erde*”), contains the meteorological titles.

Lists of current meteorological literature are also published regularly in the following periodicals:

- Halbmonatliches Literaturverzeichnis der “Fortschritte der Physik.”* Braunschweig.
Meteorologische Zeitschrift. Braunschweig.
 Monthly weather review. Washington.
Naturæ novitates. Berlin.
 Quarterly journal of the Royal meteorological society. London.

2. METEOROLOGY IN GENERAL.

- Abbe, Cleveland.** The aims and methods of meteorological work, especially as conducted by national and state weather services. Baltimore. 1899. [219]–330 p. 4°. (Maryland. Weather service. Special publication, v. 1, pt. 3a.)
- ***American meteorological journal.** May, 1884–April, 1896. [Monthly.] v. 1, Detroit; 2–8, Ann Arbor; 9–12, Boston. 1884–1896. 8°.
- Angot, Alfred.** *Traité élémentaire de météorologie.* 2d ed. Paris. 1907. vi, 417 p. 8°. The leading textbook of the subject in French. Elementary and nonmathematical.
- Arrhenius, S. A.** *Lehrbuch der kosmischen Physik, Zweiter Teil.* Leipzig. 1903. viii, [473]–1026 p. 8°.
- Bebber, W. J. van.** *Lehrbuch der Meteorologie für Studierende und zum Gebrauche in der Praxis.* Stuttgart. 1890. xii, 391 p. 8°. Intermediate. Contains abundant numerical data.
- Börnstein, R.** *Leitfaden der Wetterkunde; gemeinverständlich bearbeitet . . .* 3d ed. Braunschweig. 1913. x, 270 p. 8°. Elementary or intermediate. One of the most useful short treatises. Contains account of the national weather services of the world.
- Buchan, Alexander.** *Handy book of meteorology.* 2d ed. Edinburgh, etc. 1868. x, 371 p. 12°.
- Davis, William Morris.** *Elementary meteorology.* Boston. 1894. xi, 355 p. 8°. Intermediate rather than elementary. Special attention to theory.
- ✓ **Greely, A. W.** *American weather.* A popular exposition of the phenomena of the weather, including chapters on hot and cold waves, blizzards, hailstorms, and tornadoes, etc., etc. New York. [1888.] xii, 286 p. 8°.
- Hann, Julius.** *Lehrbuch der Meteorologie.* Leipzig. 1901. xiv, 805 p. 4°. *Same.* 2d ed. Leipzig. 1906. xi, 642 p. 4°. An invaluable textbook and reference book. The first edition contains much fuller bibliographic references; the second is reduced in size but brought up to date; so that both are needed in a meteorological library. Third ed. in preparation.

✓ **International meteorological committee.** Codex of resolutions adopted at international meteorological meetings, 1872-1907 . . . London. 1909. 80 p. 8°. (Great Britain. Meteorological office. M. O. no. 200.)

Digest of the decisions and recommendations adopted by the International meteorological congresses, conferences, and committee; also index to the reports and papers published as appendices to the general reports of meetings. A later edition in German (Internationaler meteorologischer Kodex, Berlin, 1911) includes resolutions adopted at the meeting of 1910; also a history and bibliography of the international meteorological organization. Spanish translation of the 2d German ed., Manila, 1913. An Italian translation is in course of publication in the Bolletino della Società meteorologica italiana (Torino). French ed. in preparation.

***Meteorologische Zeitschrift.** Jan., 1884-date. [Monthly.] Braunschweig (formerly Berlin, then Wien). 1884-date. 4°.

Issued during the first two years of its existence by the Deutsche meteorologische Gesellschaft; was then consolidated with Zeitschrift der Oesterreichischen Gesellschaft für Meteorologie (published from 1866) and has since been published by the Austrian and German societies jointly. General author and subject index to v. 1-25, Braunschweig, 1910.

Milham, W. I. Meteorology; a text-book on the weather, the causes of its changes, and weather forecasting, for the student and general reader. New York. 1912. xvi, 549 p. 8°.

The latest comprehensive treatise on meteorology in English. Planned as a college textbook, but not too difficult for the general reader.

Mohn, H. Grundzüge der Meteorologie . . . 5th ed. Berlin. 1898. xii, 419 p. 8°.

Elementary.

Moore, Sir John. Meteorology, practical and applied. 2d ed. London. 1910. xxvii, 492 p. 8°.

Moore, Willis L. Descriptive meteorology. New York, etc. 1910. xviii, 344 p. 8°.

***Royal meteorological society, London.** Quarterly journal of the Royal meteorological society. Nov., 1871-date. [Quarterly.] London. 1873-date. 8°. v. 1-9, "Quarterly journal of the Meteorological society." Continues Transactions of the same society, v. 1, 1839; Quarterly journal of meteorology and physical science, Jan., 1842-Oct., 1843; Reports of the Council of the British meteorological society, 1851-61; and Proceedings of the Meteorological society, v. 1-5, 1862-71. General indexes, 1839-1881 and 1882-1900.

Scott, Robert H. Elementary meteorology. 4th ed. London. 1887. xiv, 410 p. 12°. (International scientific series.)

Reprinted 1903, etc.

Sprung, A. Lehrbuch der Meteorologie. Im Auftrage der Direktion der Deutschen Seewarte bearbeitet . . . Hamburg. 1885. xii, 407 p. 8°.

"The best elementary mathematical statement of the subject."—W. M. Davis.

Trabert, Wilhelm. Lehrbuch der kosmischen Physik. Leipzig, etc. 1911. x, 662 p. 8°.

Trabert, Wilhelm. Meteorologie und Klimatologie. Leipzig, etc. 1905. 132 p. 8°. (Die Erdkunde, von Maximilian Klar. 13. Teil.)

Umlauf, Friedrich. Das Luftmeer. Die Grundzüge der Meteorologie und Klimatologie. Wien. 1891. viii, 488 p. 8°.

***United States. Weather bureau.** Bulletin of the Mount Weather observatory. 1908-date. [Quarterly.] Washington. 1908-1913. 8°.

Includes memoirs on meteorological topics, addressed to somewhat advanced readers, and the results of observation and research at Mount Weather and elsewhere. To be merged in Monthly weather review after 1913.

***United States. Weather bureau.** Monthly weather review. July, 1872-date. [Monthly.] Washington. 1872-date. 4°.

Prior to July, 1891, published by U. S. Signal service. Originally only a bulletin of current meteorological conditions in the United States and Canada; was gradually enlarged to include the features of a general meteorological journal. Beginning July, 1909, it was further enlarged to include the data of observations at regular and co-operative stations formerly published in the "section reports" of the Climatological service, while its literary features were much restricted, part of them being transferred to the Bulletin of the Mount Weather observatory. After 1913 will probably resume approximately the scope it had prior to July, 1909. Includes a running bibliography of meteorology and climatology.

Waldo, Frank. Elementary meteorology for high schools and colleges. New York, etc. [1896.] 373 p. 12°.

Brief but comprehensive course for beginners.

Waldo, Frank. Modern meteorology; an outline of the growth and present condition of some of its phases. London. 1893. xxiii, 460 p. 12°. (Contemporary science series.)

For somewhat advanced students. Not a general treatise but a presentation of certain branches, especially apparatus and methods, and the dynamics of the atmosphere.

Ward, Robert De Courcy. Practical exercises in elementary meteorology. Boston. 1899. xiii, 199 p. 8°.

A laboratory method, especially designed for use in American grammar and high schools.

3. WEATHER. WEATHER CHARTS. WEATHER FORECASTS.

Abbe, Cleveland. Preparatory studies for deductive methods in storm and weather predictions. Washington. 1890. 165 p. 8°. (United States. Signal office. Annual report of the chief signal officer for 1889. Appendix 15.)

Abercromby, Ralph. Principles of forecasting by means of weather charts. 2d ed. London. 1885. viii, 123 p. 8°. (Great Britain. Meteorological office. Official, no. 60.)

Abercromby, Ralph. Weather; a popular exposition of the nature of weather changes from day to day. London. 1887 (*5th impression 1902*). xix, 472 p. 12°. (International scientific series.)

Bebber, W. J. van. Anleitung zur Aufstellung von Wettervorhersagen für alle Berufsklassen, insbesondere für Schule und Landwirtschaft. 2d ed. Braunschweig. 1908. vi, 38 p. 8°.

Bebber, W. J. van. Handbuch der ausübenden Witterungskunde. Geschichte und gegenwärtiger Zustand der Wetterprognose. Stuttgart. 1885-86. 2 v. 8°.

v. 1 is a history of weather forecasting from the earliest times; v. 2, an exposition of modern theory and practice.

Bliss, George S. Forecasting the weather. Washington. 1913. 34 p. 8°. (United States. Weather bureau. Bulletin 42.)

Chambers, George F. The story of the weather; simply told for general readers. London. 1897. 232 p. 24°. (Library of useful stories.)

Garriott, E. B. Long-range weather forecasts. Washington. 1904. 68 p. 8°. (United States. Weather bureau. Bulletin 35.)

Garriott, E. B. Weather folk-lore and local weather signs. Washington. 1903. 153 p. 8°. (United States. Weather bureau. Bulletin 33.)

Haines, Jennie Day, comp. Weather opinions, a book of quotations with interleaves on weather subjects. San Francisco, etc. 1907. 98 p. xxiii interleaves. 8°.

Inwards, Richard. Weather lore; a collection of proverbs, sayings, and rules concerning the weather. 3d ed. London. 1898. xii, 233 p. 8°.

Appendix contains a bibliography of weather lore.

Kassner, Carl. Das Wetter und seine Bedeutung für das praktische Leben. Leipzig. 1908. vi, 148 p. 12°. (Wissenschaft und Bildung.)

Chiefly noteworthy is part 3, on the relations of the weather to practical life; its effects on agriculture, commerce, transportation, communication, manufactures, health, mortality, crime, etc.

Moore, Willis L. Weather forecasting; some facts historical, practical, and theoretical. Washington. 1899. 16 p. 8°. (United States. Weather bureau. Bulletin 25.)

Repr. from The Forum, May, 1898.

Scott, Robert H. Weather charts and storm warnings. 3d ed. London. 1887. vi, 229. 8°.

Shaw, W. N. Forecasting weather. London and N. Y. 1911. xxvii. 380 p. 8°.

4. ATMOSPHERIC PRESSURE AND CIRCULATION. DYNAMIC METEOROLOGY.

- Abbe, Cleveland.** The mechanics of the earth's atmosphere. A collection of translations. [Second collection.] Washington. 1891. 324 p. 8°. (Smithsonian miscellaneous collections, 843.)
Translations of papers by Hagen, Helmholtz, Kirchhoff, Oberbeck, Hertz, Bezold, and Margules, and reprints of papers by Rayleigh and Ferrel.
- Abbe, Cleveland.** The mechanics of the earth's atmosphere. A collection of translations. Third collection. Washington. 1910. iv, 617 p. 8°. (Smithsonian miscellaneous collections, v. 51, no. 4.)
Translations or reprints of papers by Hadley, Poisson, Tracy, Bräschmann, Erman, Kerber, Sprung, Pockels, Gorodensky, Gold, Guldberg & Mohn, Bezold, Neuhoﬀ, Bauer, and Margules.
- Bigelow, Frank H.** Report on the international cloud observations . . . Washington. 1900. 787 p. 4°. (United States. Weather bureau. Report of the chief, 1898-99, v. 2.)
Includes comparative study of the contributions of Ferrel, Oberbeck, Sprung, Hertz, Bezold, etc., and a proposed uniform system of fundamental constants and formulæ.
- Bjerknes, V., & others.** Dynamic meteorology and hydrography. Washington. 1910-1911. pts. 1-2, with portf. of plates. 4°. (Carnegie institution of Washington. Publication 88.)
Pt. 1, Statics. Pt. 2, Kinematics. Pt. 3, Dynamics. in preparation. German edition, Braunschweig, 1912-.
- Brillouin, Marcel.** Mémoires originaux sur la circulation générale de l'atmosphère. Paris. 1900. xx, 163 p. 8°.
Comprises translations and abstracts of the principal contributions of Halley, Hadley, Maury, Ferrel, Werner Siemens, M. Möller, Oberbeck, and H. von Helmholtz.
- Exner, Felix M., & Trabert, W.** Dynamische Meteorologie. Leipzig. 1912. 179-234 p. 8°. (Encyklopädie der mathematischen Wissenschaften, Band 6, 1B, Heft 3.)
- Ferrel, William.** A popular treatise on the winds; comprising the general motions of the atmosphere, monsoons, cyclones, tornadoes, waterspouts, hailstorms, etc., etc. New York. 1889 (*and later reprints*). vii, 505 p. 8°.
- Ferrel, William.** Recent advances in meteorology, systematically arranged in the form of a text-book . . . Washington. 1886. 440 p. 8°. (United States. Signal office. Annual report of the chief signal officer, 1885. Appendix 71.)
A deductive mathematical discussion of the dynamics of the atmosphere. A list of the rather numerous typographical errors in this work will be found in American meteorological journal, v. 4, July, 1887, p. 118.
- Hildebrandsson, H. Hildebrand, & Teisserenc de Bort, Léon.** Les bases de la météorologie dynamique. Historique—État de nos connaissances. Paris. 1898—. 3 v. 4°.
Comprehensive history of the development of dynamic meteorology and review of the data on which it is based. In course of publication.
- Wegener, Alfred.** Thermodynamik der Atmosphäre. Leipzig. 1911. viii, 331 p. 8°.

5. STORMS. MARINE METEOROLOGY.

- Algué, José.** The cyclones of the far east. 2d ed. Manila. 1904. 283 p. 4°. (Philippine islands. Weather bureau. Special report of the director.)
- Allingham, William.** A manual of marine meteorology for apprentices and officers of the world's merchant navies. London. 1900. xvi, 182 p. 12°. (Griffin's nautical series.)
- Bigelow, Frank H.** Storms, storm tracks, and weather forecasting. Washington. 1897. 87 p. 8°. (United States. Weather bureau. Bulletin 20.)
- Davis, William Morris.** Whirlwinds, cyclones, and tornadoes. Boston, etc. 1884. 90 p. 24°. ("Science" series.)
- Doberck, W.** The law of storms in the eastern seas. 4th ed. Hongkong. 1904. 44 p. 8°. (Hongkong observatory, no. 3.)

- Eliot, Sir John. Hand-book of cyclonic storms in the Bay of Bengal for the use of sailors . . . 2d ed. Calcutta. 1900-1901. 2 v. 8°.
v. 1. Text. v. 2. Plates.
- Fassig, Oliver L. Hurricanes of the West Indies. Washington. 1913. 27 p. 25 plates. (United States. Weather bureau. Bulletin X.)
- Finley, John P. Tornadoes. What they are and how to observe them; with practical suggestions for the protection of life and property. New York. 1887. 196 p. 12°.
- Garriott, E. B. Storms of the Great Lakes. Washington. 1903. 9 p., 968 charts. 4°. (United States. Weather bureau. Bulletin K.)
Charts of all important storms of the Great Lakes during the 25 years 1876-1900.
- Garriott, E. B. West Indian hurricanes. Washington. 1900. 69 p. 4°. (United States. Weather bureau. Bulletin H.)
- Great Britain. *Meteorological office*. A barometer manual for the use of seamen, a text-book of marine meteorology; with an appendix on the thermometer, hygrometer, and hydrometer. 7th ed. London. 1912. 83 p. 8°. (Official, no. 61.)
- Hazen, H. A. The tornado. New York. 1890. ii, 143 p. 12°. (Fact and theory papers.)
- Köppen, W. Grundlinien der maritimen Meteorologie . . . Hamburg. 1899. vi, 83 p. 12°.
- Piddington, Henry. The sailor's horn-book for the law of storms; being a practical exposition of the theory of the law of storms, and its uses to mariners of all classes, in all parts of the world . . . 6th ed. London. 1876. xviii, 408 p. 8°.

6. ECONOMIC EFFECTS OF EXTREME TEMPERATURES. FROST PROTECTION.

- Church, J. E., & Fergusson, S. P. The avoidance and prevention of frost in the fruit belts of Nevada. Reno, Nev. 1912. 58 p. 8°. (University of Nevada. Agricultural experiment station. Bulletin 79.)
- Garriott, E. B. Notes on frost. Revised by A. G. McAdie. Washington. 1910. 32 p. 8°. (United States. Department of agriculture. Farmers' bulletin 104.)
- Lewis, C. I., & Brown, F. R. Preliminary frost fighting studies in the Rogue River Valley. Corvallis, Oreg. 1911. 62 p. 8°. (Oregon. Agricultural experiment station. Bulletin 110.)
- McAdie, Alexander G. Frost fighting. Washington. 1900. 15 p. 8°. (United States. Weather bureau. Bulletin 29.)
- O'Gara, P. J. The protection of orchards in the Pacific northwest from spring frosts by means of fires and smudges. Washington. 1910. 24 p. 8°. (United States. Department of agriculture. Farmers' bulletin 401.)
- Williams, H. E. Temperatures injurious to food products in storage and during transportation, and methods of protection from the same. [Revised ed.] Washington. 1896. 20 p. 8°. (United States. Weather bureau. Bulletin 13.)

7. CLOUDS.

- Clayden, Arthur W. Cloud studies. London. 1905. xiii, 184 p. 8°. Proposes an elaborate amplification of the international cloud nomenclature. Fully illustrated.
- Clayton, H. Helm. Observations made at the Blue Hill meteorological observatory . . . Discussion of the cloud observations. Cambridge [Mass.]. 1896. 269-500 p. 4°. (Annals of the Astronomical observatory of Harvard college, v. 30, pt. 4.)
Includes an extensive history of cloud nomenclature.
- ✓ International meteorological committee. International cloud-atlas . . . 2d ed. Paris. 1910. 24 p., xiv plates. f°. In French, English, and German. Colored plates. This is the official international classification of clouds, adopted by all countries. Several more detailed classifications, based upon this, have been proposed by cloud specialists.

- Ley, W. Clement.** *Cloudland; a study on the structure and characters of clouds.* London. 1894. xiv, 208 p. 8°.
- Loisel, Julien.** *Atlas photographique des nuages.* [2d ed.] Paris. [1912.] f°. Contains 20 cloud photographs.
- United States. Weather bureau.** *Classification of clouds for the guidance of observers.* [Washington. 1911.] 12 plates. 32°.
New edition, in booklet form, of the cloud chart issued in 1905.
- Vincent, J.** *Atlas des nuages.* Bruxelles. 1907. 29 p. f°. (Annales de l'Observatoire royale de Belgique. Nouvelle série. Annales météorologiques.)

8. ATMOSPHERIC ELECTRICITY. THUNDERSTORMS. LIGHTNING PROTECTION.

- Anderson, Richard.** *Lightning conductors; their history, nature, and mode of application.* 3d ed. London, etc. 1885. xv, 470 p. 8°.
Bibliography, p. 414-462, includes most of the literature of lightning as well as of lightning conductors, from the year 1519.
- Angot, Alfred.** *The aurora borealis.* London. 1896. xii, 264 p. 8°. (International scientific series.)
- Flammarion, Camille.** *Thunder and lightning.* Translated by Walter Mostyn. Boston. 1906. 281 p. 12°.
A popular descriptive work, devoted chiefly to the effects of lightning.
- Gockel, Albert.** *Die Luftelektrizität. Methoden und Resultate der neueren Forschung.* Leipzig. 1908. vi, 206 p. 8°.
- Gockel, Albert.** *Das Gewitter.* 2d ed. Köln. 1905. 264 p. 8°.
Elementary treatise on the phenomena of thunderstorms. Contains a chapter on "hall-shooting."
- Hedges, Killingworth.** *Modern lightning conductors; an illustrated supplement to the Report of the Lightning research committee of 1905; also the Phoenix fire office 1910 rules, with notes as to the methods of protection and specifications.* 2d ed. London. 1910. vi, 119 p. 8°.
- Henry, Alfred J.** *Lightning and lightning conductors.* Washington. 1909. 20 p. 8°. (United States. Dept. of agriculture. Farmers' bulletin 367.)
- Henry, Alfred J.** *Loss of life in the United States by lightning.* Washington. 1901. 21 p. 8°. (United States. Weather bureau. Bulletin 30.)
- Henry, Alfred J.** *Recent practice in the erection of lightning conductors.* Washington. 1906. 20 p. 8°. (United States. Weather bureau. Bulletin 37.)
- Kähler, Karl.** *Luftelektrizität.* Berlin, etc. 1913. 151 p. 16°. (Sammlung Götschen Nr. 649.)
- Lodge, Sir Oliver J.** *Lightning conductors and lightning guards . . .* London. 1892. xii, 544 p. 12°. (Specialists' series.)
- Loisel, Julien.** *Les orages; application des ondes hertziennes à leur observation.* Paris. [1912.] vii, 120 p. 8°.
The latest comprehensive treatise on thunderstorms.
- McAdie, Alexander G., & Henry, Alfred J.** *Lightning and the electricity of the air . . .* Washington. 1899. 74 p. 8°. (United States. Weather bureau. Bulletin 26.)
- Mache, H., & Schweidler, E. von.** *Die atmosphärische Elektrizität. Methoden und Ergebnisse der modernen luftelektrischen Forschung.* Braunschweig. 1909. xi, 247 p. 8°. (Die Wissenschaft. Heft 30.)
- Spang, Henry W.** *A practical treatise on lightning protection.* Rev. ed. New York. 1883. 63 p. 12°.
- ***Terrestrial magnetism and atmospheric electricity . . .** [Quarterly.] Baltimore. 1896-date. 8°.

On recent advances in atmospheric electricity consult further the articles "Atmospheric electricity," by C. Chree, in *Encyclopædia Britannica*, 11th ed., 1910; "Luftelektrizität" in *Meyers grosses Konversations-Lexikon*, 6th ed., v. 12, 1905; "Die atmosphärische Elektrizität," by H. Gerdien, in A. Winkelmann's "Handbuch der Physik," 2d ed., v. 4, pt. 1, 1905, p. 687-729; and G. C. Simpson, "Normal electrical phenomena of the atmosphere," in *Quarterly Journal of the Royal meteorological society*, v. 31, 1905, p. 295-307. These include references to the principal literature.

9. ATMOSPHERIC OPTICS.

Besson, Louis. Les différentes formes de halos et leur observation. Paris. 22 p. 8°.

Repr. from Bulletin de la Société astronomique de France, mars-mai 1911.

Pernter, J. M., & Exner, Felix M. Meteorologische Optik. Wien, etc. 1910. xvii, 799 p. 8°.

The only extensive modern treatise devoted exclusively to this branch of optics; but consult further Mascart, E. Traité d'optique, Paris, 1889-1894, especially v. 3.

10. INSTRUMENTS. INSTRUCTIONS TO OBSERVERS.

Abbe, Cleveland. Treatise on meteorological apparatus and methods. Washington. 1888. 392 p. 8°. (United States. Signal office. Annual report of the chief signal officer for 1887, appendix 46.)

Angot, Alfred. Instructions météorologiques. 5th ed. Paris. 1911. vi, 161 p. 8°.

*Great Britain. *Meteorological office*. The observer's handbook . . . Annual edition. London. 1909-date. 8°. (M. O. 191.)

Not published for 1912.

Guillaume, Ch. Ed. Traité pratique de la thermométrie de précision. Paris. 1889. xv, 336 p. 8°.

A standard treatise on thermometry.

Heiskell, Henry L. Instructions to the marine meteorological observers of the U. S. Weather bureau. 3d ed. Washington. 1910. 68 p. 8°. (United States. Weather bureau. [Publication.])

[Jelinek, Carl.] Jelineks Anleitung zur Ausführung meteorologischer Beobachtungen nebst einer Sammlung von Hilfstafeln. 5th ed. Wien. 1905-1910. 2 pts. 4°. (Austria. K. k. Zentralanstalt für Meteorologie und Geodynamik. [Publication.])

Marriott, William. Hints to meteorological observers. 7th ed. London. 1911. 75 p. 8°. (Royal meteorological society. [Publication.])

Marvin, C. F. Anemometry . . . 3d ed. Washington. 1907. 76 p. 8°. (United States. Weather bureau. Circular D, Instrument division.)

Marvin, C. F. Barometers and the measurement of atmospheric pressure . . . 4th ed. Washington. 1912. 110 p. 8°. (United States. Weather bureau. Circular F, Instrument division.)

Marvin, C. F. Instructions for obtaining and tabulating records from recording instruments. 3d ed. Washington. 1913. 31 p. 8°. (United States. Weather bureau. Circular A, Instrument division.)

Marvin, C. F. Instructions for the care and management of sunshine recorders. 3d ed. Washington. 1911. 22 p. 8°. (United States. Weather bureau. Circular G, Instrument division.)

Marvin, C. F. Measurement of precipitation . . . 3d ed. Washington. 1910. [Reprinted 1913.] 39 p. 8°. (United States. Weather bureau. Circular E, Instrument division.)

Prussia. *K. preussisches meteorologisches Institut*. Anleitung zur Anstellung und Berechnung meteorologischer Beobachtungen. 3d ed. Berlin. 1913-. 2 pts. 4°.

United States. *Weather bureau*. Instructions for cooperative observers. 4th edition, comprising circulars B and C, Instrument division. Washington, 1911. 29 p. 8°.

11. TABLES.

International meteorological committee. International meteorological tables . . . Paris. 1890. v. p. f°.

In French, English, and German.

[Jelinek, Carl.] Jelineks Psychrometer-Tafeln erweitert und vermehrt von J. Hann; neu herausgegeben und mit Hygrometer-Tafeln versehen von J. M. Pernter. 6th ed. Leipzig. 1911. xii, 123 p. f°.

Includes bibliography of the psychrometer and the hair hygrometer, p. xi-xii.

Marvin, C. F. Psychrometric tables for obtaining the vapor pressure, relative humidity, and temperature of the dew-point from readings of the wet and dry bulb thermometers. [New ed.] Washington. 1912. 87 p. 8°. (United States. Weather bureau. W. B. no. 235.)

Smithsonian institution. Smithsonian meteorological tables . . . 3d ed. Washington. 1907. 1x, 280 p. 8°.

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